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Comparison of dietary quality among Puerto Ricans living in Massachusetts and Puerto Rico

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Abstract

Background—Puerto Ricans are burdened by nutrition-related diseases, with greater disease prevalence among Puerto Ricans residing in the continental U.S. compared to those in Puerto Rico (PR). However, little is known about diet quality of these two groups.

Objective—To compare diet quality of Puerto Ricans in Massachusetts (MA) and PR.

Methods—Puerto Rican patients from health centers in MA (n=42) and PR (n=52) completed a food frequency questionnaire. Diet quality was assessed with the Healthy Eating Index-2010 (HEI). Analysis included Mann-Whitney, Chi-square and logistic and quantile regressions.

Results—57.1% of participants in MA and 19.6% in PR had a poor diet. Adjusting for age and education, participants in MA were more likely to have a poor diet (OR=3.4; p=0.02) and lower HEI scores than participants in PR.

Conclusion—Diet quality among Puerto Ricans is poor, and is worse among mainland Puerto Ricans compared to islanders.

Keywords

Latino; Puerto Ricans; Diet quality; Healthy Eating Index

Introduction

Puerto Ricans are the second largest Latino group in the U.S. (1), with a greater proportion residing in the mainland U.S. than in Puerto Rico (PR). While little is known about chronic conditions experienced by mainland and island Puerto Ricans, evidence suggests that mainland Puerto Ricans may experience greater burden of selected diet-related chronic conditions and mortality compared to islanders (2,3,4). Diet quality may reduce the risk of

developing some chronic diseases (5), but little is known about the diet quality of these two groups.

The Boston Puerto Rican Health Study assessed the diet quality of 1,269 mainland adult Puerto Ricans (6) using the Healthy Eating Index-2005 (HEI). Findings showed that only 20% of the sample had good diet quality (HEI-2005 > 80). Studies evaluating diet quality of adults in PR are scarce. Using the Diet Quality Index, a study of 275 college students in PR found that 62.1% had inadequate dietary patterns (7). To our knowledge, no studies have compared the diet quality of mainland and island Puerto Ricans. This study sought to do such comparison.

Methods

Study Design and Participants

This study used data from two cohorts of Puerto Rican participants of the Latino Health and Well Being Study in Lawrence, MA, and Ponce, PR. The first cohort included participants from a community health center that provides services to 80–85% of Latinos in Lawrence, a largely low-income community. Recruitment occurred between September 2011–May 2013. A total of 3,067 patients were sampled, of which 284 were ineligible and 1547 were unreachable. Among the remaining 1,236 patients, 484 refused to participate and 150 did not attend the appointment. In all, 602 were recruited. The second cohort was designed to mirror the Lawrence cohort and recruited participants from three health clinics serving low-income communities in Ponce, between May 2014–April 2015. In all, 475 patients were sampled of which 12 were ineligible and 175 were unreachable. Among the remaining 288 patients, 141 refused and 54 did not attend the appointment, and 93 were recruited.

Eligibility and sampling strategy were similar for both cohorts. Eligible patients were of Latino ethnicity, between 21–85 years, English or Spanish-speaking, who received care at the clinic (recruitment site) in the previous two years. Exclusion criteria included inability or unwillingness to give informed consent, and plans to move out of the area within 12 months. Recruitment used a quota-sampling frame stratified by age and gender.

Letters describing the study were sent to potential participants. Bilingual/bicultural coordinators contacted patients, assessed eligibility and scheduled visits. At the visit, trained staff obtained written informed consent and conducted assessments. Participants received a monetary incentive for their time. In Lawrence, 112 participants were classified as Puerto Rican (born in PR or had a parent born in PR). A subset of these participants (n= 52) and all participants in Ponce were invited to complete a food frequency questionnaire (FFQ). Participants received an additional incentive for the FFQ. In all, 42 and 52 Puerto Rican participants in Lawrence and Ponce, respectively, completed the FFQ. This analysis included only participants that completed the FFQ. One participant from PR was excluded due to outlying values on the FFQ (>6,000 kcal).

The Institutional Review Board of Ponce Health Sciences University, University of Puerto Rico Medical Sciences Campus and University of Massachusetts Medical School approved the study.

Measures

Sociodemographics—Demographic data (age, gender, place of birth, education and perceived income adequacy) were self-reported. Education level was defined as the highest level of education attained. Perceived income adequacy was assessed with the question: “In general, would you say you have more money than you need, just enough money for your needs, or not enough money to meet your needs?”. Response options were collapsed to “not enough” and “enough/more than enough” because only one participant reported “more than enough”. This measure was used to capture participants’ economic well-being, and was used instead of household income, which is prone to high levels of missing data (8).

Diet quality—Dietary intake was assessed with the Multicultural Food Frequency Questionnaire, adapted for Puerto Ricans (9), and diet quality was calculated using the HEI-2010 (10). The following components are scored from 0–5: total fruits, whole fruits, total vegetables, greens and beans, total protein and seafood and plant proteins. Other components are scored from 0–10: whole grains, dairy, fatty acid ratio, sodium and refined grains. The empty calories component is scored from 0–20. The HEI is calculated by adding the component scores, and ranges from 0–100. Diet quality is categorized as poor (< 50), needs improvement (51–80) and good (>80) (11).

Analysis

Descriptive statistics included median (P_{25} , P_{75}) for continuous variables and frequencies for categorical variables. Demographics, HEI-2010 score and HEI components were contrasted by place of residence using Mann-Whitney, Chi-square and Fisher’s exact test in bivariate analysis. Multivariable logistic and quantile regression models assessing the association of place of residence (living in PR as the reference category) with HEI score and components adjusted for age and education. SPSS (Version 20) and STATA (version 14.1) programs were used.

Results

Cohort characteristics (Table 1) show differences in educational level with lower high school completion in MA compared to PR. Half of participants in MA and one fifth of participants in PR had poor diet quality (table 2), and differences were statistically significant for both continuous scores and quality categories. Comparisons of individual HEI components showed significant differences with the MA cohort having lower scores in seven components and higher in one component compared to the PR cohort. In adjusted models for age and education, participants in MA were three times more likely than those in PR of having a poor diet and were more likely to have lower median diet quality score, lower median scores in six components and higher median score in one component compared to those in PR.

Discussion

To our knowledge, this is the first study to compare diet quality among mainland and island Puerto Ricans. Because mainland Puerto Ricans may have greater prevalence of some diet-

related chronic diseases than islanders (2,3), and diet quality is associated with lower chronic disease risk (5), it is important to understand dietary intake in these two groups.

Diet quality was far from optimal in both cohorts but was worse in MA. Participants in MA had lower intake of whole fruits, vegetables, beans and proteins, inferior fat quality intake and greater intake of empty calories than those in PR. Consistent with our findings, differences in dietary intake between Latinos in their native country vs. the U.S. have been previously reported. Latino immigrants from the Caribbean, and Central and South America, have reported a greater intake of high fat and low quality foods post-migration, and consumption of higher quality foods pre-migration (11,12).

Our results highlight the need to understand migration and acculturation factors influencing dietary changes in this group. These may be environmental, financial and lifestyle factors (12,13). Latino immigrants report dietary changes due to greater availability of processed foods, higher price of fresh produce and limited variety of produce and staple foods than what they were used to in their native country (14). Fresh produce availability is also lower in the mainland U.S. given that cultivation was a common practice in their native country (14,15). This population also experiences lifestyle changes associated with work schedules, limiting time for home cooking and promoting uptake of fast foods (15). Lastly, during the acculturation process, immigrants change their lifestyles to adopt norms of the receiving country, and assimilation to the dietary intake of that of the mainland U.S. is no exception.

Our study has strengths and limitations. Limitations include the small sample size and the cross-sectional nature of the study. Generalizability may be limited to the two locations of the study. Although MA is among the top migration destinations for Puerto Ricans, the most recent migration wave has been relocating in the south (i.e., Florida) (16), and may have different characteristics. Similarly, although Ponce is an urban area in the south of the island, findings may not be generalizable to rural areas or urban areas in other parts of the island. This study focused in Puerto Ricans, an understudied population experiencing health disparities, high rates of migration to the mainland, and that are different from other Latinos given the sociopolitical relationship of PR with the U.S. Lastly, although there were differences in the recruitment timeline of the study, the research protocols used for both cohorts were primarily similar, facilitating comparisons between samples.

In conclusion, this study characterized and compared the diet quality of a small sample of Puerto Ricans in MA and PR. It identified the important problem of poor diet quality among mainland and island Puerto Ricans, as well as specific differences, with lower diet quality among Puerto Ricans in MA. These results may serve as foundation for understanding dietary changes that occur due to migration to the mainland U.S. among Puerto Ricans. Future studies with larger sample sizes, various geographic locations in the island and the mainland U.S., and longitudinal designs are needed.

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Table 1

Socio-demographic characteristics of the sample by place of residence.

Characteristics	Ponce-PR N=51 (54.8%)	Lawrence-MA N=42 (45.2%)	P value
<i>Socio-demographics</i>			
Gender			
Male	21 (41.2)	20 (47.6)	0.533
Female	30 (58.8)	22 (52.4)	
Place of Birth^a			
Puerto Rico	47 (94.0)	35 (83.3)	0.177
Mainland U.S.	3 (6.0)	7 (16.7)	
Age Categories (years)			
21–34	14 (27.5)	15 (35.7)	0.057
35–54	17 (33.3)	20 (47.6)	
55–84	20 (39.2)	7 (16.7)	
Perceived Income^b			
Not enough	23 (46.9)	26 (61.9)	0.153
Enough/More than enough	26 (53.1)	16 (38.1)	
Educational Level^{b*}			
High school	15 (30.6)	24 (57.1)	0.011
> High School	34 (69.4)	18 (42.9)	

^aOne Puerto Rican participant from Ponce born in the Dominican Republic was excluded.

^bData missing for two participants from Ponce, PR.

* Statistically significant by Chi-Square ($p < 0.05$).

Table 2

Diet quality of the sample by place of residence

Characteristics	Ponce, PR N= 51(54.8%)	Lawrence, MA N=42(45.2%)	P value
HEI-2010 Categorical score^ε		N (%)	
Poor	10 (19.6)	24 (57.1)	
Needs Improvement	40 (78.4)	18 (42.9)	0.001
Good	1 (2.0)	0 (0.0)	
HEI-2010 score		Median (P₂₅, P₇₅)	
Total score	58.7 (51.2, 67.1)	46.7 (37.9, 52.0)	<0.0001
Total Vegetables	3.71 (2.92, 4.86)	2.37 (1.36, 2.87)	<0.0001
Greens and Beans	1.87 (0.90, 3.29)	0.16 (0.06, 0.32)	<0.0001
Total Fruit	2.64 (1.46, 4.10)	1.80 (0.89, 2.84)	0.032
Whole Fruit	2.77 (1.32, 4.46)	1.27 (0.47, 2.45)	<0.0001
Whole Grains	2.07 (1.05, 3.55)	1.65 (0.68, 3.83)	0.362
Dairy	6.27 (4.15, 7.90)	8.25 (5.61, 10.0)	0.002
Total Protein	5.00 (5.00, 5.00)	4.18 (3.27, 4.67)	<0.0001
Seafood and Plant Protein	2.58 (1.29, 3.95)	1.61 (1.21, 2.75)	0.080
Fatty Acid Ratio	5.66 (3.13, 8.06)	1.71 (0.06, 5.40)	<0.0001
Sodium	0.93 (0.00, 3.08)	0.00 (0.00, 2.27)	0.354
Refined Grains	10.0 (8.82, 10.0)	10.00 (7.41, 10.0)	0.384
Empty Calories	16.1 (12.56, 20.0)	10.0 (6.54, 14.8)	<0.0001

^εStatistically significant by Fisher's Exact Test (p<0.05).

[†]Statistically significant by Mann Whitney (p<0.05).

Table 3

Regression analyses evaluating relationship between place of residence and diet quality.

Categorical HEI-2010^d	OR	95% C.I.	P value
Poor	3.41	1.18, 9.86	0.02
Total HEI-2010 and score components^b	B	95% C.I.	P value
Total score	-7.89	-13.5, -2.23	0.007
Total Vegetables	-1.01	-1.67, -0.36	0.003
Greens and Beans	-1.68	-2.34, -1.02	<0.001
Total Fruit	-0.84	-1.95, 0.28,	0.139
Whole Fruit	-1.17	-2.20, -0.14	0.027
Whole Grains	-0.26	-1.39, 0.87	0.650
Dairy	2.57	0.84, 4.31	0.004
Total Protein	-0.83	-1.12, -0.54	<0.001
Seafood and Plant Protein	-0.74	-1.62, 0.15	0.100
Fatty Acid Ratio	-3.22	-5.05, -1.38	0.001
Sodium	-0.93	-2.12, 0.26	0.124
Refined Grains	0.30	-0.82, 1.42	0.597
Empty Calories	-3.73	-6.40, -1.06	0.007

* All models are adjusted for age and education.

^a Binary logistic regression. One participant with good diet quality deleted from analysis.

^b Quantile regression. In all regression models, living in PR was used as the reference category.